GIOVANNI SCHIAPARELLI
&
GIOVANNI GUGLIELMINI

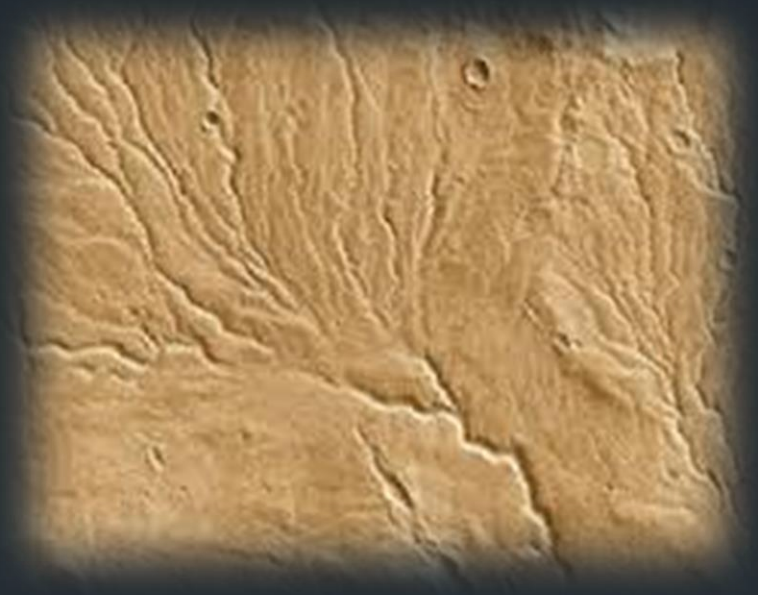
BIOGRAPHY

Giovanni Schiaparelli was born in Savigliano on 14th March 1835 and died in Brera, Milan, on 4th July 1910.

BIOGRAPHY

He attended the high school in Savigliano and he took a degree in engineering in Torino in 1854 when he was 19.

Since he was a child he had loved stars and watching the sky, and even if he took a degree in engineering, his passion was astronomy.

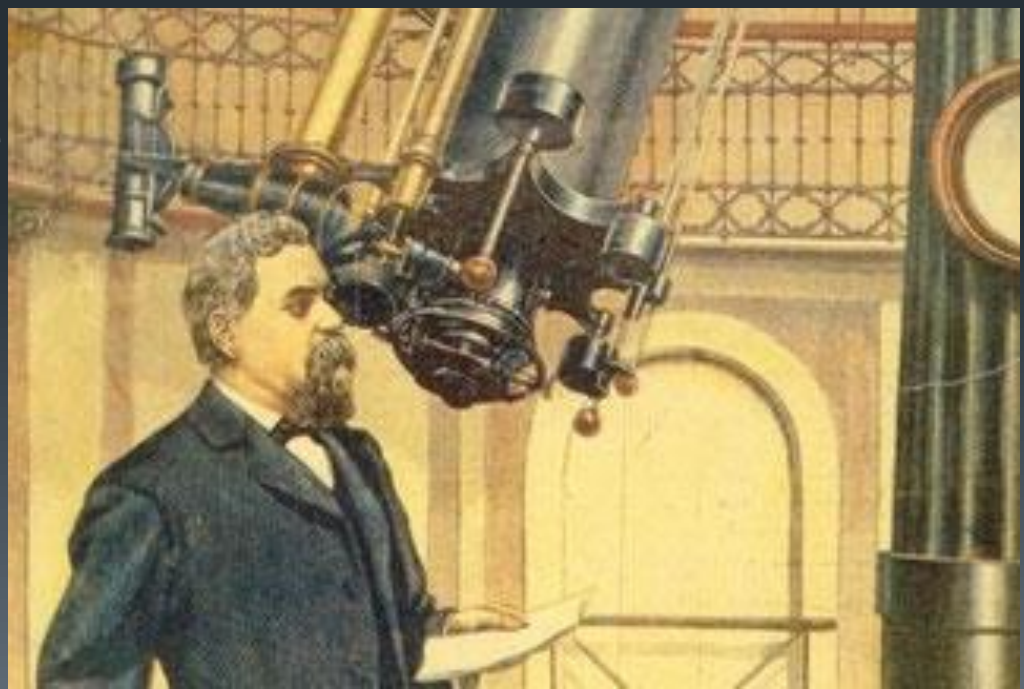


BIOGRAPHY

He couldn’t work in the scope of his degree, but he worked in observatories in Russia and Germany where he discovered the channels on Mars. When he came back to Italy, he was struck by a disease and for this reason, he retired until his death, in 1910, when he was 65 years old.

BIOGRAPHY

Schiaparelli was the director of the Brera Observatory in Milan. In 1877 he started to observe the surface of Mars. He used “Merz” a new 3.5m-long-refractor with the diameter of 22 cm that was something completely new for the age. Today it is in the ”Museo delle Scienze e della Tecnica” in Milan. He named the Martian “seas” and “continents” (dark and light areas of the surface) after historic and mythological characters.



SCHIAPARELLI'S BINARY STARS

DISCOVERIES

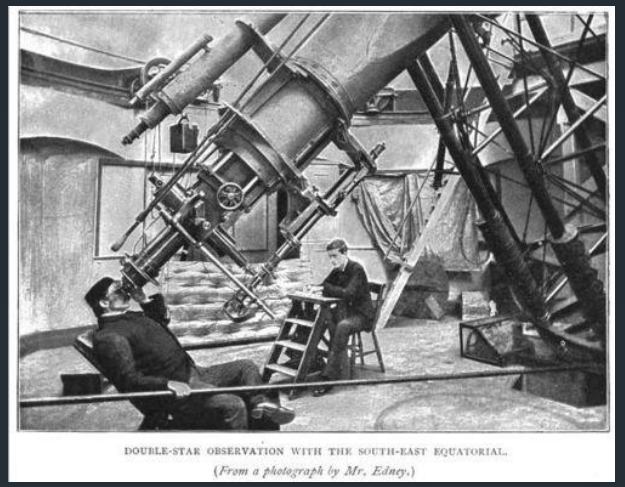
WHAT ARE THE BINARY STARS?

Binary stars are objects of great charm and beauty, and their observation even just "cosmetic" or "contemplative", as we want to suggest in these pages, is an opportunity for in-depth technical and scientific discovery, and leads to a deep knowledge of the starry sky and observation tools.

HOW DID SCHIAPARELLI DISCOVER BINARY STARS?

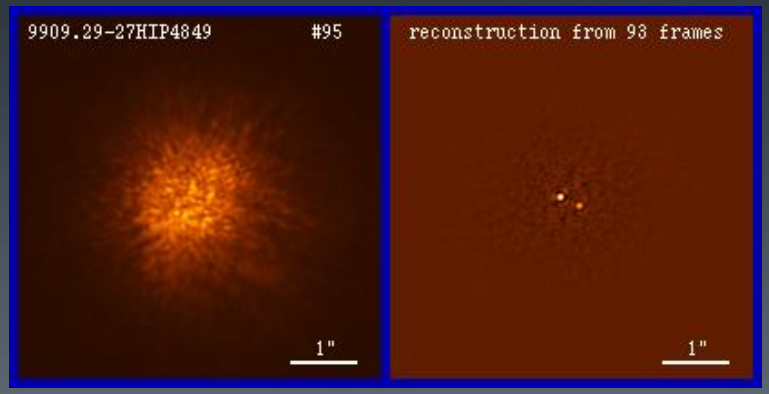
DISCOVERIES

Schiaparelli discovered binary stars when working at Brera observatory using a very powerfull telescophy. The telescophy was a rifractor one.



DOUBLE-STAR OBSERVATION WITH THE SOUTH-EAST EQUATORIAL.
(*From a photograph by Mr. Edney.*)

today



Today the work of measuring double stars is done by a small number of observers, since other branches of astronomy and astrophysics have taken over in the interest of researchers. The techniques of observation are in any case much more sophisticated. It is a field open to the contributions of well equipped amateurs who are endowed with method and perseverance - the micrometer wires (which draws on the tradition of the great visualist) and the CCD are the main tools.

CLASSIFICATION OF BINARY STARS

DISCOVERIES

First of all it must be made an initial division into optic binary stars and physical ones.

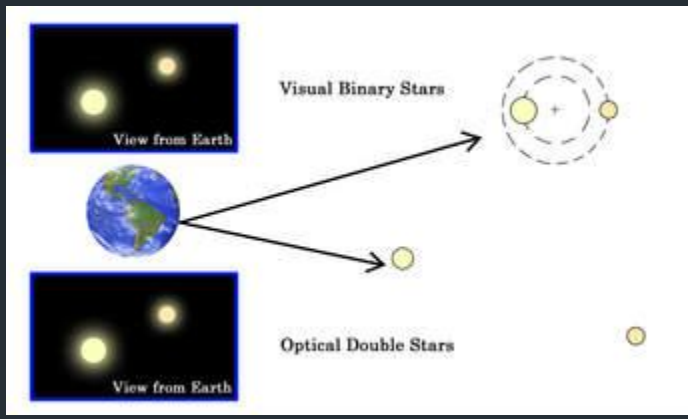
it can however happen that two stars seemingly close in the sky are actually many light years from each other and do not have any connection between them: these are **the twin optical or perspective stars**, that until the late eighteenth century were believed to constitute the majority of couples of stars.

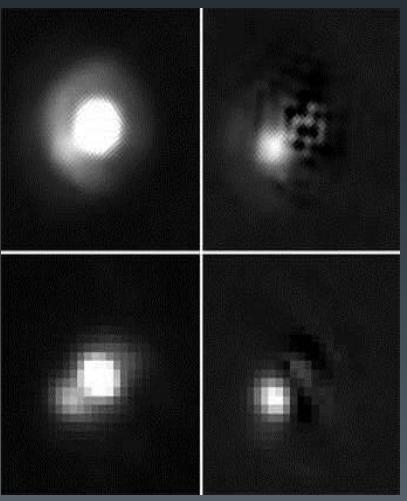
The physical binary stars are those pairs of stars characterized by a gravitational physical bond between the components of the system: both stars (or more than two in the case of a multiple system) revolve around the common center of mass.

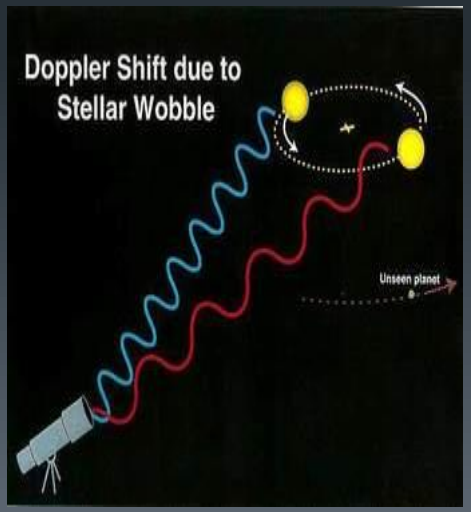
DISCOVERIES

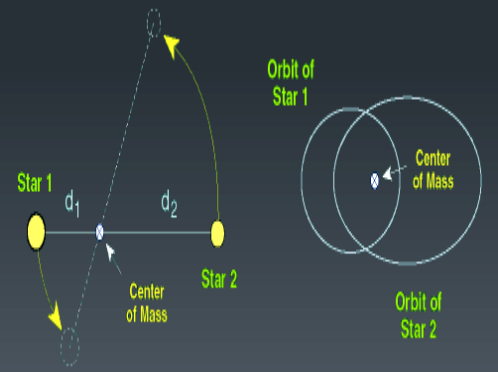
Double physical stars, which are the subject of study of amateur and professional astronomers, are further classified as follows:

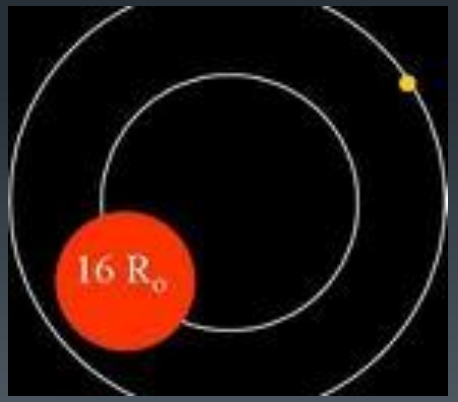
- **visual binaries**
- **binary astrometric**
- **binary interferometric**
- **spectroscopic binaries**
- **binary photometric**





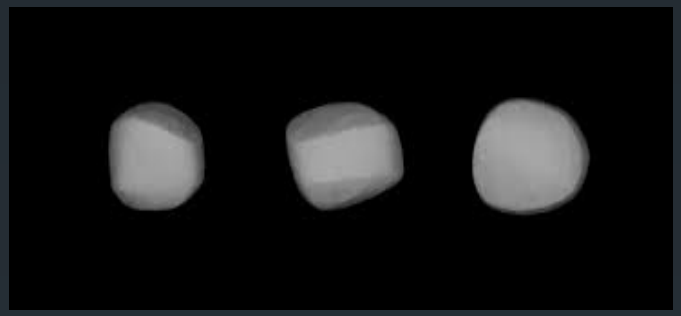






DISCOVERIES

Asteroid 69 HESPERIA



In Schiaparelli's most important discoveries we can find the Asteroid 69 HESPERIA, casually discovered on 29th April 1861 from the observatory of Brera in Milan, where he worked as an astronomer.

- The name of this Asteroid comes from the Nymphes Esperidies, which were a part of the Greek mythology and the studies on this Asteroid are still open.
- The Asteroid is in the main band and these are its caratheristics :
- Its **extention** is about 138,1 km
- It has got a **mass** about 2,76x 10^18 kg
- It has got an average **density** about 2,0 g/cm^3
- **Rotation period**: about six hours.
- **Temperature**: about 159 K.
- **Absolute magnitude** :7,05

STUDIES ABOUT MERCURY

DISCOVERIES

In 1800 - three centuries after Galileo's discovery of telescope - Giovanni Schiaparelli, using his telescope of 22 cm of opening, noticed that on Mercury's surface there were some dark spots and he thought they were clouds. As he saw always the same face of Mercury (like the Moon), he supposed that Mercury's rotation period was about 88 days. At the begin of '900 an astronomer confirmed his theory, but only in 1965 we were able to understand the precise rotation period, confirmed by the drill MARINER 10.

THE MISTAKE

DISCOVERIES

With his telescope he saw a lot of channels: big depressions in the soil, they are not very deep but quite extended - from 100 km to 200 km and maybe more. In his book “ Life on Mars” he wrote:” In absence of rain on Mars, this channels are probably the main mechanism by which the water (and with it organic life) can spread on the dry surface of the planet”. So the scientists of that period thought there was intelligent life on Mars. An Italian astronomer, Vincenzo Cerulli, helped scientists come to the conclusion that what Schiaparelli had observed was mere optical illusion.

TODAY

DISCOVERIES

For this mistake, unfortunally, a lot of people remember Schiaparelli in a negative way , but the mistranslation helped to inspire one of the most popular genres of science book and fiction. Without it,we may well not have a lot of very beautiful films like Indipendence Day or War of the Words that are about extra-life on Mars.

CURIOSITY

A team of specialists from Airbus Defence and Space (Aquitaine), who arrived in Baikonur last week, have been recently busy placing and sealing the last of the tiles on Schiaparelli's heat shield and rear cover.

In October this year, as it plummets through the Martian atmosphere towards the surface, Schiaparelli – the ExoMars 2016 entry, descent and landing demonstrator module – will experience very high temperatures, possibly as high as 1850°C.

For most of the descent, a front heat shield and a rear cover will protect the module.

The front shield, which has a diameter of 2.4 m and weighs 80 kg, is a carbon sandwich structure covered of 90 insulating tiles. These tiles are made of Norcoat Liège, a thermal ablative material composed of resin and cork.

The rear cover, which contains the parachute that is deployed during the descent and some engineering sensors to measure aerothermal parameters, is composed of 93 tiles, attached to a carbon sandwich structure.

The rear cover tiles and the complete front shield were produced by Airbus Defence and Space and delivered to the prime contractor, Thales Alenia Space, in July 2014.

CURIOSITY

This week, as the final launch preparation activities for Schiaparelli draw to a close, it was time to place most of the remaining tiles and bond them into position. The final three tiles will be placed after the installation of Schiaparelli on top of the Trace Gas Orbiter.
This tile placement activity was performed by highly trained specialists, who needed to operate flawlessly while following a very tight schedule. Bonding the tiles is carried out by following a very accurate procedure in which the mass of the bonding agent is controlled with a precision of better than 1 g and the position of each tile is within less than 1 mm of where it must be.
As Schiaparelli has been fuelled, extra safety precautions have to be taken and the specialists carrying out the difficult tasks of placing, bonding and curing the tiles have to wear special protective suits. This was the last task to be carried out on Schiaparelli before it is united with the Trace Gas Orbiter to form what is known as the Spacecraft Composite.

GIOVANNI GUGLIELMINI

BIOGRAPHY

Gianbattista Guglielmini was born in Bologna on November 19th, 1760 and was the firstborn. He attended the seminary in Bologna and then the university where he graduated in Philosophy 6th August 1787. His family was neither poor nor wealthy.

BIOGRAPHY


Bologna

Shortly after graduation, he moved to Rome at the end of November 1788, at the service of Cardinal Ludovisi. The most important project to which he devoted himself from the beginning of his stay in Rome was an experiment to demonstrate the diurnal motion of the Earth.
The death of Ludovisi put an end to the project and to the Roman stay. He returned to Bologna at the beginning of July 1790 and he went back to work on his experiment to prove the rotation of the Earth.

BIOGRAPHY

Napoleon Bonaparte came to Bologna on 20th June 1796. From this moment Guglielmini started to be more and more interested and involved in politics.
On 19th November 1800 at the University of Bologna he was awarded the title of sublime mathematician and soon after he got the chair of astronomy, on 25th November 1803. Subsequently, after several events he left the chair of astronomy at the University and moved to Padua. Then he returned to Bologna he resumed his pure mathematics studies.

BIOGRAPHY

In the last period of his life his main interest turned to algebra and the history of mathematics.
He died in Bologna 17th December 1817.
Despite his political and administrative positions, and his college career he didn't leave many material possessions to his sister Teresa, but a magnificent library in which he had invested most of its revenue.

THE CALCULATIONS

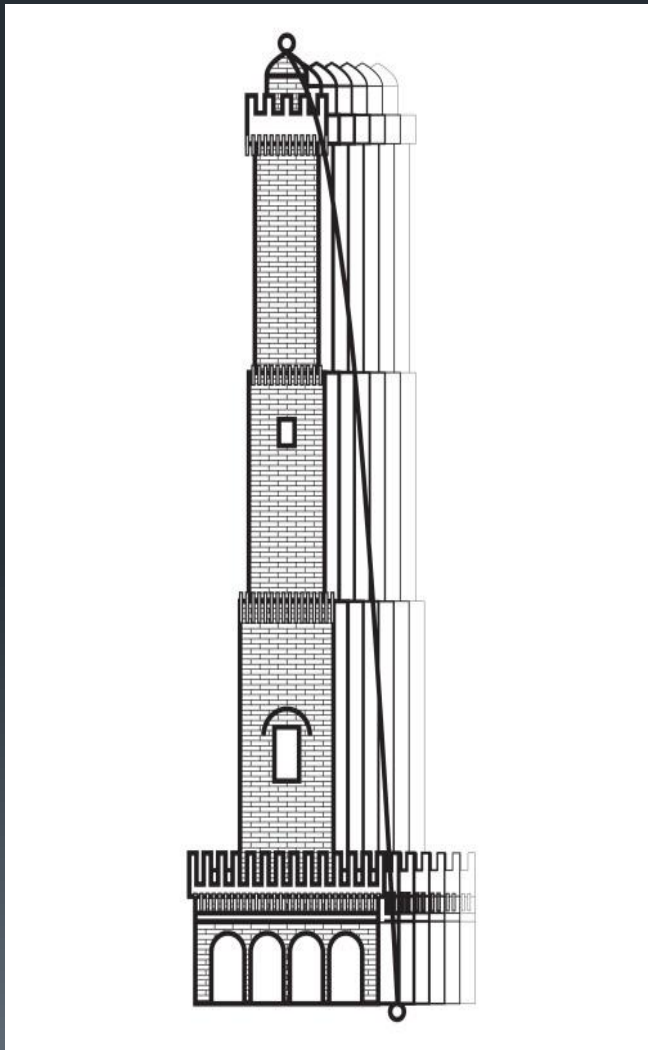
DISCOVERIES

The **object falls** towards East according to **Newton's first law**

Tangetial velocity at the top > Velocity at the base

To **calculate** the **tangential velocity** we can use the formula:

$$v.lat = 2\pi \, rpLat / dsid$$



DISCOVERIES

Always according to Newton's first law, the **object dropping** from the top of the tower will keep its own **tangential velocity**

runs along a space > than that one on the base

we can use the formula:

$S_{required} = S_{on\ the\ top} - S_{at\ the\ base}$

To calculate **the falling time**: $t = \sqrt{2h/g}$

Finally:

$$\Delta s = \omega \cdot h \cdot \cos Lat \cdot \sqrt{2h/g}$$

Where: $\omega = 2\pi/d_{sid}$

h = *height*

lat = *latitude*

g = *gravitational acceleration (9,81m/s²)*

EARTH'S ROTATION

DISCOVERIES

Guglielmini was one of the first physicists to demonstrate through physical evidence the Earth's rotation. In 1791 he went to the Asinelli Tower in Bologna and, from a height of 100 meters, he dropped small balls of lead with a diameter of one inch, and realized that they were deviated to the east of 16 mm. He justified the outcome of the experiment by saying that if the body had been subject to gravity, it would have fallen along the vertical; but since the earth is subject to the motion of rotation, the balls fell on the ground along a parabola, as the initial velocity is constant. Since the Earth's rotation takes place in a counterclockwise direction, that is, from west to east, the corresponding vectors face east and so the falling body goes eastward from the vertical, that is determined with a plumb-line. For this reason, a body that is located on top of a tower will fall to the ground faster than a body that is at its bottom, because its distance from the earth axis of rotation is greater. And as a body tends to mantain for inertia the speed of initial rotation, it will fall to the ground deviated to the east.

In reaching these conclusions he had to perform several experiments (in fact he threw 16 balls) because of the wind and the fact that the body had to be motionless before the launch. He also had to take into consideration the angular velocity of the motion of the earth's rotation, which is 360 °.

Around 1792 he gathered the results in the book "De Diurno Terrae Motu", in Latin to allow the widest possible dissemination.

Thank you
for your attention!!!

An idea of class 1° B/D of Arimondi-Eula,
in collaboration with:
Margaria Donatella (Science teacher);
Ambroggio Roberta (English teacher).